

A REVISION OF THE INDO-AUSTRALIAN SMICROMORPHINAE  
(HYMENOPTERA : CHALCIDIDAE)

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ABSTRACT

The taxonomic relationships, biology and distribution of the Smicromorphinae are discussed. Species of the only genus *Smicromorpha* Girault are believed to be parasites of the larvae of the Indo-Australian weaver ant *Oecophylla smaragdina* (Fabricius). *S. doddi* Girault and *S. minera* Girault (from Australia) and *S. keralensis* Narendran (from southern India) are redescribed; *S. eudela* sp. nov. (from Australia) and *S. banksi* sp. nov. (from Australia and New Guinea) are described. Lectotypes are selected for *S. doddi* and *S. cadaverosa* Girault (= *S. doddi*, syn. nov.). *Smicromorphella* Girault is synonymized with *Smicromorpha*.

INTRODUCTION

The Smicromorphinae is the least known and perhaps the most bizarre subfamily of chalcidid wasps. All species have ophonoid facies (Gauld and Huddleston 1976), and an elongate, tail-like metasoma inserted high on the propodeum (Fig. 1), as in Gasteruptionidae. Girault (1913) proposed a monotypic tribe for *Smicromorpha doddi* Girault, a parasite of the weaver (= green tree) ant *Oecophylla smaragdina* (Fabricius) in north-eastern Queensland, and subsequently described two additional species and a second genus (Girault 1914, 1915, 1926, 1930). Narendran (1979) described a species from India and elevated the tribe to subfamily status. For nearly 50 years Smicromorphinae have been represented in collections by a handful of specimens, most of which were in poor condition. However, long series recently collected in various northern Australian localities now permit a re-evaluation of the status of the group and of the described species.

Terminology generally follows Bouček (1974), along with Bohart and Menke (1976) for the mesopleural carinae; Copland and King (1972) for the ovipositor; and Eady (1968) for microsculpture.

The following abbreviations and symbols are used: (1) *Morphological terms* (see Figs 10, 20–27, 32, 38): a, acdeagus; aa, aedeagal apodeme; ah, anterior horn of ovipositor; ap, anterior petiole; b, basal ring; bt, basitarsus; c, cercus; d, digitus; F1, F2, flagellar segments 1, 2.; f, hind tibial

furrow; fp, fulcral plate; fs, fulcral plate spines; FW, minimum distance between compound eyes, measured across frons; ip, inner ovipositor plate; lb, laminated bridge; LF, minimum distance between lower margins of antennal toruli and clypeo-labral suture; li, ligament; lm, lamina; M, minimum distance between compound eye and oral fossa; m, metanotum; MAE, maximum diameter of compound eye; OD, maximum diameter of lateral ocellus; op, outer ovipositor plate; OOL, distance between lateral ocellus and compound eye; OS, minimum distance between median ocellus and antennal scrobes; ph, phragma; POL, distance between lateral ocelli; pp, posterior petiole; pr, propodeum; S1, S2, metasomal sternites 1, 2; sp, semicircular plate; SW, maximum width of antennal scrobe; T1, T2, metasomal tergites 1, 2; t, propodeal teeth; ts, tibial spur; UF, minimum distance between lower margins of antennal toruli and anterior margin of median ocellus.

(2) *Collections*: AMNH, American Museum of Natural History, New York, USA (Ms M. Favreaux); ANIC, Australian National Insect Collection, CSIRO, Canberra (Dr I.D. Naumann); BMNH, British Museum (Natural History), London, UK (Dr J.S. Noyes; Dr Z. Bouček, CIE); BPBM, Bernice P. Bishop Museum, Honolulu, Hawaii, USA (Mr G. Nishida); NTAS, Entomology Section, Division of Agriculture and Stock, Department of Primary Production, Darwin (Mr A. Allwood); QDPI, Department of Primary Industries, Entomology Branch, Brisbane (Dr I.D. Galloway); QM,

Queensland Museum, Brisbane (Mr E.C. Dahms); UQIC, Department of Entomology, University of Queensland, Brisbane (Ms M. Schneider); USNM, United States National Museum of Natural History, Washington D.C., USA (Dr E. Grissell, USDA).

#### Subfamily SMICROMORPHINAE Girault

Smicromorphini Girault, 1913, p. 70; Narendran, 1979, p.908.

Smicromorphinae Narendran, 1979, p.910.

#### DESCRIPTION

**FEMALE.** Body: 4.0-5.9 mm long. Head, mesosoma, and petiole strongly sclerotized; gaster weakly sclerotized. Integument predominantly translucent, yellow to orange in colour, occasionally with brown to black markings, non-metallic. Pubescence short, fine, silvery, inconspicuous.

**Head:** Hypognathous, slightly broader than pronotum. Vertex and frons finely sculptured, without prominent carinae or projections; posterior surface of head smooth. Compound eye moderate-sized to very large, bare, inner margin entire. Ocelli moderate-sized to very large. Occipital carina absent, occipital suture dorsally distinct; temple short, dorsally rounded, ventrally carinate; posterior surfaces of head concave, closely appressed to pronotum. Subocular suture indistinct, weak or distinct. Antennal scrobes deep, margins usually carinate, OS/OD more than 0.5, without median carina. Torulus slightly above or slightly below level of ventral margin of compound eye, never near to anterior tentorial pit. Anterior tentorial pit and frontoclypeal suture indistinct. Anterior margin of clypeus very weakly emarginate, not produced. Labrum exposed, small, wider than long, distal margin convex. Mandibles (Fig. 8) asymmetrical: right mandible with inner, rounded, weakly sclerotized lobe and outer, elongate, acute, strongly sclerotized tooth; left mandible with inner, stout, acute, strongly sclerotized tooth and outer, weakly sclerotized process. Labio-maxillary complex small. Maxilla: cardo present; stipes elongate, with 2 apical lobes (1 with single strong seta); palp absent. Labium: glossa represented by broad, setose lobe; paraglossa small, setose; palp absent. Antenna: very short, 9-segmented, with short, inconspicuous pubescence; scape 3.6-4.8 times as long as wide; pedicel swollen; flagellum fusiform or filiform (distal segments often collapsed in dried material), F1 1.0-1.5 X as long as wide, sometimes much shorter than F2; clava

unsegmented, hardly differentiated.

**Mesosoma:** Short, broad, generally more coarsely sculptured than head. Pronotum: medially very short, without transverse carinae; dorsolaterally usually with transverse carina; lateral panel short, with rounded anterior margin; anterior surfaces more-or-less flat, neck represented by narrow rim. Mesoscutum: notaulix distinct, percurrent; parapsidal furrow absent. Mesoscutellum broad; axilla differentiated, separated from supra-alar area by fine, longitudinal carina; frenum not differentiated. Tegula elongate-oval, not spatulate, not reaching pronotum. Prepectus minute, scale-like, moveable, at anterior end of tegula. Mesopleuron with deep ventral depression to receive reflexed mid femur; upper mesopleuron not subdivided; onaulus and acetabular carina present or absent, subonaulus weak, short. Metanotum medially very short and unsculptured; dorsellum absent; laterally sculptured. Metapleuron not defined. Propodeum rugose-punctate, without carinae or plicae; spiracle reniform, spiracular sulcus variable; petiolar foramen situated anteriorly, separated from metanotum by very narrow rim which gives rise to phragma (Fig. 23).

**Legs:** Fore coxa slender, slightly more than 0.5 x length of fore femur. Trochantellus absent from all legs. Fore femur slender. Fore tibia with single, small, minutely bifid, apical spur; apical tooth absent. Mid coxa globular, less than 0.5 x length of mid femur. Mid femur slender. Mid tibia slender, straight, with single, small, apical spur. Hind coxa subcircular in cross-section, almost as long as hind femur, coriaceous to granulate. Hind femur greatly enlarged, its outer ventral margin usually with comb of fine teeth; without additional longitudinal carinae or inner teeth; coriaceous, setigerous punctures dense and conspicuous. Hind tibia shorter, stouter than fore and mid tibiae; strongly curved; dorsoapically with furrow (Fig. 10) for reception of reflexed basitarsus; ventrally with percurrent inner and outer longitudinal carinae; ventroapically produced into a spine slightly longer than basitarsus; with small spur near apex of spine; without additional external longitudinal carinae. Tarsi 5-segmented; fore and mid tarsi more slender than hind tarsus; claws minute; arolii large.

**Wings:** Dorsally and ventrally densely pubescent; pubescence sparser proximally, but not forming distinct rows or bands. Fore wing: submarginal vein long, parallel to costal margin,

usually with distal swelling (stump of basalis); marginal vein short, at most about as long as stigmal vein; basal cell area without sclerotized spot;  $R_s$ , median vein and  $Cu_2$  suggested by indistinct brown colouration. Hind wing: submarginal vein 0.6 x as long as wing; with 1 straight and 2 hook-shaped hamuli.

Metasoma: Elongate, slender (Fig. 1), T1 and S1 fused to form a petiole (Fig. 21); segments 2-4 depressed, subcylindrical; segments 5-8 laterally compressed. Anterior petiole with strong dorsal condyle providing major articulation with propodeum (Figs 22, 24); posterior petiole defined anterolaterally and anteroventrally by transverse lamina (rarely ventrally interrupted), posteriorly slightly overlapping T2 and S2. T2 shorter than S2; with 2 anterolateral articulations with petiole. S2 elongate, extending dorsally between T2 and T3 to form weakly sclerotized tube. T3 and S3 each of equal length and deeply telescoped into S2. T4, S4 and T5, S5 not deeply telescoped into preceding segments. S6 longer than T6, medially divided into 2 hemisternites. T7 large; 2 laterotergites present internally. T8 (epipygium) divided medially into two hemitergites (Fig. 26); cercus short, not articulated, with 4 short setae, recessed in depression near posterior margin. Spiracles absent from all segments. Petiole, T2, S2-S4 bare, T3-T8 setose. Anterior margins of only T2 and S2 thickened. Anterior margins of T2 convex, of S2 straight, of T3-T7 and S3-S5 emarginate. Posterior margins of T2-T6 straight, of T7 convex. Ovipositor concealed at rest; inner ovipositor plate without articulated palp, posteriorly plates connected by transverse, sclerotized bridge; 11 funeral plate spines present; funeral plate articulations and ligaments as in Fig. 27; ramus spines indistinguishable.

MALE. Differs from female as follows.

Antenna: With 7-9 segments. F1 0.7-1.4 x as long as wide.

Metasoma: Tergites and sternites as in Fig. 20. T6-T8 each elongate, differentiated into an anterior, bare, reticulate-sculptured portion concealed by preceding tergite and an exposed, posterior, setose portion. T8 undivided; cercus on posterior margin. S6-S8 small, undivided. Anterior margins of T6-T8 very weakly emarginate, of S3-S8 emarginate. Posterior margins of tergites convex, of sternites more-or-less straight. Genitalia (Fig. 25): basal ring elongate, unspecialized; cuspis with 3 setae; digitus elongate, bidentate; aedeagus slender, unspecialized; parameres absent.

#### REMARKS ON MORPHOLOGY AND CLASSIFICATION OF SMICROMORPHINAE

It is beyond the scope of the present paper to analyse comprehensively the phylogenetic relationships among the subfamilies of Chalcididae. However, it is clear that the species here assigned to the Smicromorphinae comprise a monophyletic group of chalcidid wasps and a group which cannot be related closely to any other subfamily of Chalcididae.

Several synapomorphic metasomal characters (the high insertion of the petiole on the propodeum, the tubulose second metasomal sternite, the division of T8 into hemitergites in females) indicate the monophyly of the group. The structure of the hind leg (large coxa, large and usually toothed femur, curved tibia) suggests that the Smicromorphinae should be classified within the Chalcididae. The hind femur is similarly enlarged and toothed in Leucospidae, some monodontomerine Torymidae (see Bouček, 1978), and some cleonymine Pteromalidae, as well as in Chalcididae. However the species of Smicromorphinae can be excluded from these non-chalcidid groups (which do not show close affinities with each other) and included in the Chalcididae by their having the following combination of characters: small, unsculptured prepectus; relatively short marginal vein; unfolded fore wing; metasomal characters as listed above.

The Smicromorphinae are unique among the Chalcididae in that the petiole is inserted very high on the propodeum (i.e. the anterior margin of the petiolar foramen is very close to the metanotum). In Smicromorphinae the foramen is separated from the metanotum by only a narrow rim which gives rise to a phragma. Convergently the petiole is inserted relatively high on the propodeum in several unrelated, extant groups of Hymenoptera: Labeninae (Ichneumonidae), Paxylommatidae and cenochoeliine Helconinae (Braconidae), Liopteridae, *Asoka* Bouček (Pteromalidae), Evanidae, Aulacidae and Gasteruptiidae. Only in Gasteruptiidae is the petiolar foramen as closely adjacent to the metasoma as in the Smicromorphinae.

Steffan (1957) established that the structure of the petiole (first metasomal segment) and its articulations with the propodeum and the second metasomal segment are characteristic for each subfamily of Chalcididae.

In Smicromorphinae the tergite and sternite of the first metasomal segment are fused to form a solid, more-or-less cylindrical petiole. A

transverse lamina divides the petiole into a short anterior position and an elongate posterior portion (Figs 22, 24). The lamina does not participate in the articulation with the propodeum. The major articulation is dorsal, through a smoothly convex condyle which occupies the width of the anterior petiole. This condyle is probably homologous with the 'rotule' of Steffan (1957). The articulation surface is more smoothly convex and undifferentiated than in any other Chalcididae figured by Steffan (1957). In the Smicromorphinae, the lamina is usually laterally and ventrally distinct, but dorsally absent. A lamina is present elsewhere in the Chalcididae only in the Chalcidinae, where it is dorsally continuous. Burks (1940) regarded the lamina as characteristic of the Chalcidinae and its presence in the Smicromorphinae suggests that the two subfamilies are related.

The posterior petiole differs from that of Brachymeliinae in that it does not enter the propodeal foramen, and from that of the Haltichellinae in that it does not partially enclose the propodeum. The posterior petiole is elongate in Epitraninae, Chalcidinae, and some Haltichellinae, as well as in Smicromorphinae. There is no petiolar spiracle in Smicromorphinae as there is in many Chalcididae (e.g. *Chalcis* Fabricius). The posterior petiole slightly encloses the anterior margins of T2 and S2. The latter are slightly thickened. A pair of small, transverse folds on T2 (and to a lesser extent on S2) serve as pivots. The posterior articulation of the petiole is most similar to that in Chalcidinae. It is unlike that of Epitraninae in which T2 encloses a sliding process from the posterior portion of the petiole and unlike that of Dirhininae in which S2 is fused to the petiole.

Thus, the morphology of the petiole suggests that the Smicromorphinae are not closely related to any other subfamily of Chalcididae, except perhaps the Chalcidinae.

Smicromorphinae are unique among the Chalcididae in that the lateral margins of S2 extend dorsally and are fused along the midline to produce a weakly sclerotized tube. T2 covers only the anterior part of this tube into which metasomal segment 3 is deeply telescoped. In females, T8 (the epipygium) is divided medially into two hemitergites, a condition unique within the Chalcididae, but approached within the Leucospidae. The absence of metasomal spiracles is also unique within the Chalcididae.

Other distinctive features of the Smicromorphinae include: (1) the ophionoid

facies (large compound eyes and ocelli; pale yellow to orange colour); (2) the mandibles, with their unusual combination of teeth, weakly sclerotized processes and lobes; (3) the absence of palps; (4) the short antenna, which in at least two species has a variable number of flagellar segments in males; (5) the very reduced pronotal collar; and (6) the slender, tail-like metasoma.

#### BIOLOGY

*Smicromorpha doddi* Girault is reported to be parasitic upon the larvae of the green tree or weaver ant *Oecophylla smaragdina* (Formicidae) (Girault 1913). Workers of *O. smaragdina* construct aerial nests of leaves bound together by the silk produced by their larvae. During nest construction the workers hold larvae in their mandibles and apply them to the leaf edges which are to be bound. According to the late F.P. Dodd, the wasp oviposits on the ant larva during nest construction (Girault 1913).

Specimens of Smicromorphinae have been collected near nests of *O. smaragdina* on several occasions, but none has been reared from nests. *O. smaragdina* is abundant in all areas from which Smicromorphinae have been collected in Australia.

At least four species of Smicromorphinae are known to be attracted to light and are therefore probably nocturnal; certainly one of these species is crepuscular. The ophionoid facies occurs within subfamilies of Ichneumonidae, Braconidae, Sphecidae, and Pompilidae, and in these groups also is correlated 'almost invariably' with nocturnal habits (Gauld and Huddleston, 1976; Naumann, unpub.).

The biological significance of most of the distinctive morphological features of the Smicromorphinae is unknown. The reduced mouthparts could be correlated with surface feeding or drinking, or with an absence of feeding. The slender metasoma is almost certainly highly mobile and telescopic, and is probably an adaptation to oviposition on or in a relatively inaccessible or mobile host.

#### DISTRIBUTION

Outside Australia Smicromorphinae are known from New Guinea, the Philippines (Riek unpub.), southern India (Narendran, 1979) and central Africa (Bouček unpub.). This distribution parallels that of the two extant *Oecophylla* spp. *O. smaragdina* is distributed from India to the Solomon Islands and throughout northern Australia; and *O. longinoda* (Latreille) occurs in tropical Africa. Fossil species of *Oecophylla* are

known from Europe (Eocene-Miocene) and eastern Africa (Miocene) (Wilson and Taylor 1964; Burnham 1979).

At present, *Smicromorpha keralensis* Narendran is known only from southern India, *S. banksi* sp. nov. is known from northeastern Australia and New Guinea. *S. doddi*, *S. minera* Girault and *S. lagynos* sp. nov. are widely distributed throughout northern Australia (Fig. 2) and *S. eudela* sp. nov. is known only from the 'Top End' of the Northern Territory. The distribution of *Smicromorpha* spp. in northern Australia corresponds closely with the distribution of *O. smaragdina*. Both *Smicromorpha* spp. and *O. smaragdina* are restricted to lowland rainforest and sclerophyll habitats and are absent or very rare at altitudes above 300m.

**SMICROMORPHA Girault**

*Smicromorpha* Girault, 1913, p.89; Girault, 1914, p.461; Girault, 1915, p.354; Gahan and Fagan, 1923, p.133; Narendran, 1979, p.908. (Type-species *Smicromorpha doddi* Girault, by original designation and monotypy.)

*Smicromorphella* Girault, 1930:12; de Santis, 1961, p.165. (Type-species *Smicromorphella minera* Girault, by monotypy.) Syn. nov.

**DESCRIPTION**

As for subfamily description.

**RELATIONSHIPS OF SPECIES OF SMICROMORPHA**

*S. minera*, *S. keralensis*, *S. lagynos*, and *S. banksi* are morphologically similar, especially with respect to the compound eye, ocelli, antennal scrobes and mesopleural carinae. *S. doddi*, with a very large compound eye and large ocelli, and *S. eudela*, with a reflexed stigmal vein, weakly developed femoral comb and non-carinate antennal scrobes are each morphologically isolated.

**KEY TO INDO-AUSTRALIAN SPECIES OF SMICROMORPHA**

1. Margins of antennal scrobes not carinate (Fig. 42); stigmal vein reflexed (Figs 15, 16), longer than marginal vein; hind femur without comb of small black teeth, distally with only 3 or 4 pale-coloured teeth..... *eudela* sp. nov.
- Margins of antennal scrobes carinate (Fig. 38); stigmal vein more or less perpendicular to costal margin (Fig. 17), approximately as long as marginal vein; hind femur with well-developed comb of small black teeth .....2
2. OD greater than OOL (Fig. 28); ventral mesopleuron transversely strigose (Fig. 31);

acetabular carina absent or very weakly indicated but never continuous with omaulus; hind femur with small, ventral process bearing basal 1 or 2 black teeth of comb..... *doddi* Girault

OD less than OOL (Fig. 34); ventral mesopleuron reticulate-rugose to transversely strigose; acetabular carina usually present and continuous with omaulus, if not then hind femur without process.....3

3. Hind femur with both long, sparse, sub-erect setae and short, dense, appressed setae (Figs 35, 37); hind femur without blunt process at proximal end of row of teeth (Fig. 37) and antennal clava longer than wide ..... *minera* Girault

Hind femur with only short, dense, appressed setae (as in Fig. 33); either hind femur with blunt process at proximal end of row of teeth (as in Fig. 1) or antennal clava wider than long.....4

4. Sternaulus present (Fig. 49); OS equal to diameter of median ocellus; frons without distinct, longitudinal groove between medial ocellus and antennal scrobes..... *keralensis* Narendran

Sternaulus absent (Fig. 45); OS greater than diameter of median ocellus; frons with distinct, longitudinal groove between median ocellus and antennal scrobes (Fig. 46).....5

5. Petiole of female ventrally distinctly swollen (Fig. 18), less than 3.7 × as long as high, transverse lamina indistinct; antennal clava longer than wide; F1 of female less than 0.7 × as long as F2..... *lagynos* sp. nov.
- Petiole of female ventrally not distinctly swollen (Fig. 19), more than 4.0 × as long as high; transverse lamina distinct; antennal clava wider than long; F1 of female 0.8 × as long as F2..... *banksi* sp. nov.

***Smicromorpha doddi* Girault**

(Figs 1-5, 8-12, 17, 20-33)

*Smicromorpha doddi* Girault, 1913, p.89; Girault, 1914, p.461; Girault, 1915, p.355; Gahan and Fagan, 1923, p.133; Narendran, 1979, p.908.

*Smicromorpha cadaverosa* Girault, 1914, p.461; Girault, 1915, p.355; Narendran, 1979, p.908. Syn. nov.

**MATERIAL EXAMINED**

SYNTYPES: *S. doddi*: 1♀, 1♂ (♀ here designated as LECTOTYPE), in QM. Lectotype ♀: thorax, fore and hind legs, anterior segments of metasoma, an micropit

through pith block; pith block on macropin, with the following labels: (i) '4489', in red ink in Girault's handwriting; (ii) '*Smicromorpha doddi* ♂ and ♀ Gir' in unrecognized handwriting, 'Types' in Girault's handwriting; (iv) 'LECTOTYPE *Smicromorpha doddi* Girault designated by I.D. Naumann 1981', on fluorescent red card; (v) 'PARALECTOTYPE *Smicromorpha doddi* Girault designated by I.D. Naumann 1981', on fluorescent blue card; head (crushed), antenna, hind leg, on slide with the following labels: (i) 'Type HY/3432 A.A. Girault'; (ii) 'Genotype, Queensland Museum, *Smicromorpha doddi* Girault, ♂ [crossed out], ♀', in unrecognized handwriting, '4489' in Girault's handwriting; (iii) 'Selected as LECTOTYPE, I.D. Naumann 1981'. Paralectotype ♂: thorax, hind legs, wings, petiole on micropin through triangular card; head, scapes, fore legs glued to same card; card on same macropin as lectotype (see above). Type locality: Darwin, Northern Territory (Girault 1913).

SYNTYPES: *S. cadaverosa*: 1♀, 1♂ (♂ here selected as LECTOTYPE), in QM. Lectotype ♂: in fair condition (minus head) on triangular card, with the following labels: (i) '4488', in red ink in Girault's handwriting; (ii) '*Smicromorpha cadaverosa* Gir, ♂, ♀ types', in Girault's handwriting; (iii) '*Smicromorpha cadaverosa* Gir' in unrecognized handwriting, 'Type', in Girault's handwriting; (iv) 'LECTOTYPE *Smicromorpha cadaverosa* Girault designated by I.D. Naumann 1981', on fluorescent red card; (v) 'PARALECTOTYPE *Smicromorpha cadaverosa* Girault designated by I.D. Naumann 1981', on fluorescent blue card; head (crushed), antenna (one attached to head), on slide with the following labels: (i) 'TYPE HY/3433 A.A. Girault'; (ii) 'Queensland Museum *Smicromorpha cadaverosa* ♂ ♀ Gir' (in unrecognized handwriting), '4488' in Girault's handwriting; (iii) 'PARALECTOTYPE (ringed) and LECTOTYPE selected by I.D. Naumann 1981.' Paralectotype ♀: fore femur and mid leg (minus coxa) on apex of same card as lectotype; head (crushed), antennae (one attached to head), ringed, on same slide as lectotype. Type locality: Nelson (now Gordonvale), Queensland (28 July 1913, A.P. Dodd) (Girault 1914).

OTHER MATERIAL EXAMINED. Northern Territory: 1♀, Darwin, 25.vi.1972, M.S. Upton, in ANIC; 1♀, 12°28'S 132°52'E, Jabiluka Lagoon, 14 km N of Mudginbarry HS, 14.xi.1972, J.C. Cardale, in ANIC; 1♀, 1♂, 12°31'S 132°54'E, 9 km N by E of Mudginbarry HS, 10-11.vi.1973, J.C. Cardale, in ANIC; 2♀, 12°43'S 132°54'E, Mt Brockham, 14 km S by E of Mudginbarry HS, 11-12.vi.1973, J.C. Cardale, in ANIC; 5♀, 3♂ 12°48'S 132°42'E, Nourlangie Ck, 8 km N of Mt Cahill, 26.x.-20.xi.1972 and 16-17.vi.1973, J.C. Cardale and D.H. Colless, in ANIC; 1♀, Baroalba Ck, Noranda, via Jim Jim, 16.xi.1972, in NTAS; 1♂ 12°50'S 132°51'E, 16 km E by N of Mt Cahill, 13.vi.1973, J.C. Cardale, in ANIC; 2♀, 2♂, 12°52'S 132°46'E, Nourlangie Ck, 6 km E of Mt Cahill, 17-18.xi.1972, J.C. Cardale, in ANIC; 1♀, Koongarra, 15 km E of Mt Cahill, 15.xi.1972, D.H. Colless, in ANIC; 1♀, ♂, 12°57'S 132°33'E, Jim Jim Ck, 19 km WSW of Mt Cahill, 17.vi.1973, J.C. Cardale, in ANIC.

Queensland: 10♀, Lockerbie, 10 miles (16 km) WSW of Somerset, 20-30.vi.1948, G.M. Tate, in AMNH; 7♀, 1♂, same locality, 13-27.iv.1973, G.B. and S.R. Monteith, in ANIC, QM, UQIC; 1♀, Bamaga, 3-6.vi.1969, G.B. Monteith, in ANIC; 1♀, Iron Range, 1-9.vi.1971, S.R. Monteith, in ANIC; 1♀, same locality, G.B. Monteith, in ANIC; 1♀, '11-Mile Scrub', 19 km N of Moreton, 1-2.vii.1975, G.B. Monteith, in ANIC; 1♀, Moreton Telegraph Station, 30.vi.1975, G.B. Monteith, in ANIC; 1♂, Brown's Ck, Pascoe R., 13.vi.1948, G.M. Tate, in AMNH; 3♀, Capsize Ck, 64 km N of Archer R. crossing, 29-30.vi.1975, G.B. Monteith, in QM, ANIC, UQIC; 1♀, Wenlock, 27.vii.1948, G.M. Tate, in AMNH; 1♀, Pat Ck, 11 km N of Archer R. crossing, 28-29.vi.1975, G.B. Monteith, in ANIC; 1♀, 15 km S of Yarraden, Coen district, 27-28.vi.1975, S.R. Monteith, in ANIC; 3♀, Christmas Ck, 15 km W of Fairview, via Laura, 26-27.vi.1975, G.B. Monteith, in UQIC, ANIC; 1♀, 15°03'S 145°09'E, 3 km NE Mt Webb, 30.iv.-3.v.1981, I.D. Naumann, in ANIC; 2♀, 1♂, 15°04'S 145°07'E, Mt Webb National Park, 28-30.xi.1980, J.C. Cardale, in ANIC; 1♀, same locality, 11-14.vii.1976, G.B. and S.R. Monteith, ANIC; 2♀, McIvor R. crossing, 40 km N of Cooktown, 15-18.vii.1976, G.B. and S.R. Monteith, in ANIC; 1♀, 15°14'S 145°07'E, 7 km N of Hope Vale Mission, 4.x.1980, J.C. Cardale, in ANIC; 1♀, 1♂, 15°16'S 144°59'E, 14 km W by N of Hope Vale Mission, 8-10.x.1980, J.C. Cardale, in ANIC; 2♀, 3♂, same locality, 7-10.v.1981, I.D. Naumann, in ANIC; 1♀, 15°29'S 145°16'E, Mt Cook National Park, Cooktown, 11-12.x.1980, J.C. Cardale, in ANIC; 14♀, 4♂, 15°41'S 145°12'E, Annan R., 3 km W by S of Black Mt, 27.ix.1980, J.C. Cardale, in ANIC, BMNH, USNM, QM; 1♀, same locality, 26-27.iv.1981, I.D. Naumann, in ANIC; 1♀, 15°47'S 145°17'E, Moses Ck, 4 km N by E of Mt Finnigan, 14-16.x.1980, J.C. Cardale, in ANIC; 13♀, 8♂, 15°47'S 145°14'E, Shipton's Flat, 16-18.v.1981, I.D. Naumann, in ANIC, QDPI; 1♂, 15°50'S 145°20'E, Gap Ck, 5 km ESE of Mt Finnigan, 13-16.v.1981, I.D. Naumann, in ANIC; 1♂ (det. as *S. cadaverosa* by Girault), Cairns, Jan. 1920, in QM; 1♀ (det. as *S. cadaverosa* by Girault), Gordonvale, Jan. 1920, in QM.

#### DESCRIPTION

FEMALE. Length: body 4.7-5.9 mm; fore wing, 2.6-3.1 mm.

Colour: Body pale yellow to orange. Mesoscutum, axilla, hind coxa distally, hind femur dorsally, sometimes with red-brown to black markings as in Figs 11, 12. Femoral teeth black.

Pubescence: Head and mesosoma with short setae. Hind femur with short, depressed setae. Flagellar setae long, sub-erect (Fig. 3).

Head: Width/length 1.8-2.1. Compound eyes very large, in dorsal view margins anteriorly convergent as in Fig. 28. Ocelli very large, POL/OOL 6.5-14.0, OD/OOL 13.0-29.0. OS less than OD, frons excavate anterior to median



ocellus. Subocular suture indistinct, M/MAE 0.1–0.2. Antennal scrobes deep, margins carinate, lateral margin very close to compound eye (Fig. 9), SW/FW 0.7–1.0, UF/LF 2.3–2.8. Vertex and upper frons minutely reticulate-punctate; lower frons and clypeus at least in part transversely striate. Antenna: F1, F2, clava 1.0–1.5, 1.0–1.6, 2.4–4.4 x as long as wide respectively. F1 0.6–1.0 x as long as F2. Flagellum weakly fusiform.

Mesosoma: Pronotal collar laterally carinate (Figs 1, 29). Mesoscutum, mesoscutellum reticulate-punctate (Figs 28, 30). Omaulus present, acetabular carina absent or at most very weakly indicated and not continuous with omaulus, sternaulus absent. Upper mesopleuron rugose-punctate, mesopleural depression strigose to reticulate-rugose, ventral mesopleuron transverse-strigose, pre-omaular area finely reticulate-coriaceous. Propodeum posteriorly convex, with very weak concavity dorsal to hind coxae; spiracular sulcus indistinct. Hind leg: coxa 3.7–5.3 x as long as wide. Femur 1.6–1.9 x as long as wide, with ventral process and well-developed comb of fine teeth distad of process (Fig. 33). Tibia slender, dorsal furrow approximately 0.3 x as long as segment. Apical tarsal segment slender, less than 0.5 x as wide as long. Fore wing: shape normal (Fig. 1). Stigmal vein shorter than marginal vein, forming a right or slightly obtuse angle with it (Fig. 17). Stump of basalis present.

Petiole: Length/width 4.5–5.6, length/height 4.1–5.5. Dorsally minutely reticulate-punctate to rugose; transverse lamina distinct, continuous, not extending posteroventrally to midlength to petiole; lateral margin not distinctly carinate in posterior 0.5.

MALE. Differs from female as follows. Length: body 4.1–5.1 mm; fore wing 2.1–2.6 mm.

Head: Width/length 1.9–2.3. Compound eye smaller (Fig. 32). Ocelli smaller, POL/OOL 1.2–2.0 OD/OOL 1.4–2.2. Lateral margin of antennal scrobes more widely separated from compound eye, SW/FW 0.4–0.6, UF/LF 2.4–2.7. Antenna: with 7 or 8 segments (Figs 4, 5). F1, F2, clava 1.0–1.3, 1.0–1.5, 1.7–2.4 x as long as wide respectively. If F2 and F3 fused (Fig. 5), F1 approximately 0.4 x as long as following compound segment.

Legs: Hind coxa 2.8–3.4 x as long as wide.

#### REMARKS

Girault originally confused the sexes of *doddi*, but corrected his error in the following year (see Girault 1913, 1914, 1915).

The colour of the mesoscutum and mesoscutellum is variable. Most commonly these

sclerites are entirely pale yellow or orange. Conspicuous red-brown to black markings (as shown in Figs 11, 12) may be present, particularly in individuals from localities in north-eastern Queensland. Individuals from these localities also tend to have darker markings on the dorsal margins of the hind femur.

#### *Smicromorpha minera* Girault

(Figs 2, 14, 34–39)

*Smicromorpha minera* Girault, 1926, p.70; Narendran, p.908.

*Smicromorphella minerva* Girault, 1930 [3]; de Santis, 1961, p.165; Dahms (1984), pp. 816, 817 (unjustified emendation of original spelling).

#### MATERIAL EXAMINED

HOLOTYPE: ♀ in QM, in fair condition, on triangular card, head and fore legs mounted separately, with following labels: (i) '4491', in red ink in Girault's handwriting; (ii) 'HOLOTYPE', printed on red card; (iii) '*Smicromorpha minerva* Gir, ♀ type' in Girault's handwriting. Type locality: Meringa, Queensland (November) (Girault 1926).

OTHER MATERIAL EXAMINED. Northern Territory: 1 ♂, 12°48'S 132°42'E, Nourlangie Ck, 8 km N of Mt Cahill, 16–17.vi.1973, J.C. Cardale, in ANIC. Queensland: 1 ♀, 15°16'S 144°59'E, 14 km W by N of Hope Vale Mission, 7–10.v.1981, I.D. Naumann, Field Note 81/14, in ANIC; 1 ♂, 15°47'S 145°17'E, Moses Ck, 4 km N by E of Mt Finnigan, 14–16.s.1980, J.C. Cardale, in ANIC; 3 ♂, Cape Hillsborough, MEQ, Hidden Valley Track, 16.vi.1979, E. Dahms, in QM, ANIC; 1 ♂, Knob Ck, Byfield, MEQ, 27.iv.1979, E. Dahms, rainforest, in QM.

#### DESCRIPTION

FEMALE. Length: body 3.9–4.0 mm; fore wing approximately 1.9 mm.

Colour: Predominantly pale yellow to orange. Vertex posteriorly red-brown; mesoscutum and mesoscutellum dark red-brown as shown in Fig. 14; hind coxa and hind femur predominantly or entirely red-brown to black. Metasoma pale red-brown, petiole sometimes entirely dark brown. Femoral teeth black.

Pubescence: Head and mesosoma with long, sparse setae. Hind femur with long, suberect setae and short, depressed setae (Figs 35, 37). Flagellar setae moderately long, suberect, curved.

Head: Width/length approximately 1.8. Compound eye moderately large (Figs 34, 36, 38). Ocelli moderately large, POL/OOL 0.7–0.8, OD/OOL 0.5–0.7. OS greater than OD, frons between median ocellus and scrobes with weak longitudinal groove. Subocular suture continuous, distinct, M/MAE 0.4–0.5. Antennal scrobes deep, margins carinate, lateral margin

widely separated from compound eye, SW/FW 0.4-0.5, UF/LF 3.3-3.4. Vertex and upper frons minutely reticulate-punctate, lower frons and clypeus at least in part transversely striate. Antenna: F1, F2, clava 0.6-1.0, 0.5-0.9, 1.1-1.4 x as long as wide respectively. F1 0.7-0.9 x as long as F2. Flagellum fusiform.

Mesosoma: Pronotal collar laterally carinate. Mesoscutellum reticulate-punctate (Fig. 39). Omaulus present, acetabular carina distinct and continuous with omaulus, sternaulus absent. Upper mesopleuron rugose-punctate, mesopleural depression strigose to reticulate-rugose, ventral mesopleuron reticulate-rugose to transverse-strigose, pre-omaular area finely reticulate-coriaceous. Propodeum posteriorly convex; spiracular sulcus indistinct. Hind leg: coxa 3.0-4.0 x as long as wide, Femur 1.6-1.8 x as long as wide, without ventral process, with well-developed comb of fine teeth. Tibia slender, dorsal furrow 0.3-0.5 x as long as segment. Apical tarsal segment slender, less than 0.5 x as wide as long. Fore wing: shape normal. Stigmal vein very slightly shorter than marginal vein, forming a very slightly obtuse angle with it. Stump of basalis present.

Petiole: Length/width 4.0-4.8, length/height 4.7-4.8. Dorsally minutely reticulate-punctate; transverse lamina distinct, continuous, not extending posteroventrally to midlength of petiole; lateral margin not distinctly carinate in posterior 0.5.

MALE. Differs from female as follows. Length: body 4.1-4.4 mm; fore wing 2.2-2.4 mm.

Colour: Pale yellow to orange, without red-brown or black markings.

Pubescence: Setae of head and mesosoma less conspicuous.

Head: Width/length 1.9-2.0. Subocular suture sometimes indistinct. M/MAE 0.6-0.7. SW/FW 0.3-0.4, UF/LF 2.9-3.2. Antenna: 7-8 segmented. F1, F2, clava 1.0-1.4, 0.7-0.9, 1.3-1.5 x as long as wide respectively. F1 0.8-1.2 as long as F2.

Mesosoma: Acetabular carina sometimes indistinct. Pre-omaular slightly more rugose. Hind leg: coxa and femur 2.7-2.9 and 1.6-1.9 x as long as wide respectively. Fore wing: stigmal vein approximately as long as marginal vein or slightly shorter.

Petiole: Length/height 4.1-4.8.

#### REMARKS

One female of *S. minera* was collected in the late afternoon as it hovered near a nest of *O. smaragdina* on the margin of rainforest. The nest

had been broken artificially, and the alarmed ants were repairing the damage.

On the label attached to the holotype, the specific name is written in Girault's hand as '*minerva*'. The spelling '*minera*' accompanied the original published description of the species, but Girault adopted the spelling '*minerva*' in a 1930 paper and in his later, unpublished manuscript. Under the International Code of Zoological Nomenclature, the emendation is unjustified.

#### *Smicromorpha eudela*, sp. nov.

(Figs 2, 7, 15, 16, 40-43)

#### MATERIAL EXAMINED

HOLOTYPE: ♀, Nourlangie Creek, 8 km N of Mt Cahill, 26 October 1972, D.H. Colless, in ANIC (Type No. 7590).

#### DESCRIPTION

FEMALE. Unknown.

MALE. Length: body approximately 4.1 mm; fore wing approximately 2.2 mm.

Colour: Pale Yellow to orange, without red-brown or black markings. Femoral teeth pale orange.

Pubescence: Head and mesosoma with short setae. Hind femur with short, appressed setae. Flagellar setae very short, straight, appressed (Fig. 6).

Head: Width/length approximately 1.9. Compound eye moderately large, in dorsal view as in Figure 40. Ocelli moderately large, POL/OOL approximately 1.3, OD/OOL approximately 0.7, frons between median ocellus and scrobes with longitudinal groove. Subocular suture absent, M/MAE 1.2. Antennal scrobes deep, margins not carinate, lateral margin widely separated from compound eye, SW/FW 0.4-0.5, UF/LF 1.3-1.4. Vertex minutely reticulate-punctate; frons striate to strigose as in Figure 42. Antenna (Fig. 7): with 9 segments. F1, F2, clava 0.8-0.9, 1.5-1.6, 1.5-1.6 x as long as wide respectively. F1 0.3-0.4 x as long as F2. Flagellum fuliform.

Mesosoma: Pronotal collar laterally not carinate. Mesoscutellum sculptured as in Fig. 43. Omaulus, acetabular carina, sternaulus, all absent (Fig. 41). Upper mesopleuron striate to very finely rugose-punctate; mesopleural depression and ventral mesopleuron striate. Propodeum posteriorly broadly concave; spiracular sulcus distinct. Hind leg: coxa 2.0 x as long as wide, femur approximately 2.3 x as long as wide, ventral process absent, distally with 3 or 4 sharp teeth but without comb of fine teeth.



Tibia distally broad, dorsal furrow less than 0.3 x as long as segment. Apical tarsal segment broad, 0.6 x as wide as long. Fore wing: truncate (Fig. 15). Stigmal vein longer than marginal vein, reflexed (Fig. 16). Stump of basalis absent.

Petiole: Length/width 4.0, length/height 4.6–4.7. Dorsally longitudinally strigose; transverse lamina distinct, extending posteroventrally to midlength of petiole, discontinuous midventrally; lateral margin distinctly carinate in posterior 0.5.

#### ETYMOLOGY

The specific name is derived from the Greek and means very distinct.

### *Smicromorpha lagynos* sp. nov.

(Figs 2, 13, 18, 44–47)

#### MATERIAL EXAMINED

HOLOTYPE: ♀, 15°14'S 145°07'E, 7 km N of Hope Vale Mission, 4 October 1980, J.C. Cardale, in ANIC (Type No. 7591).

PARATYPES: Northern Territory: 1 ♂, 12°06'S 133°04'E, Cooper Ck, 19 km E by S of Mt Borradaile, 5–6.vi.1973, J.C. Cardale, in ANIC; 1 ♀, 12°35'S 132°52'E, Magela Ck, 2 km N of Mudingbarry HS, 14–15.xi.1972, J.C. Cardale, in ANIC. Queensland: 2 ♀, 1 ♂, 15°29'S 145° 16'E, Mt Cook National Park, 10–12.v.1981, I.D. Naumann, in ANIC, QM; 1 ♀, Bramston Beach, near Innisfail, 30.iv.1967, D.H. Colless, open savannah, in ANIC.

#### DESCRIPTION

FEMALE. Length: Body 4.6–4.9 mm; fore wing approximately 2.4 mm.

Colour: Predominantly pale yellow to orange. Mesoscutum and mesoscutellum (as in Fig. 13) petiole, coxa externally and femur dorsally and dorso-externally red-brown to black. Femoral teeth black. In some specimens, vertex within ocellar triangle, posterior surface of head and mesoscutum entirely red-brown to black.

Pubescence: Head, mesosoma, hind femur with short, appressed setae. Flagellar setae moderately long, suberect (Fig. 6).

Head: Width/length 1.9–2.0. Compound eye moderately large (Figs 44, 46). Ocelli moderately large, POL/OOL 0.8–0.9, OD/OOL 0.6–0.7, OS greater than OD, frons between median ocellus and scrobes with distinct longitudinal groove. Subocular suture continuous, distinct M/MAE 0.4–0.5. Antennal scrobes deep, carinate, lateral margin widely separated from compound eye, SW/FW 0.4–0.5, UF/LF 3.3–3.4. Vertex and upper frons minutely reticulate-punctate, lower frons and clypeus at least in part transversely striate. Antenna (Fig. 6): F1, F2, clava 0.7–1.0,

1.0–1.2, 2.1–3.2 x as long as wide respectively. F1 0.4–0.7 x as long as F2. Flagellum fusiform.

Mesosoma: Pronotal collar laterally carinate (Fig. 47). Omaulus present, acetabular carina distinct and continuous with omaulus, sternaulus absent (Fig. 45). Upper mesopleuron rugose-punctate, mesopleural depression strigose to reticulate-rugose, ventral mesopleuron transverse-strigose, pre-omaular area finely reticulate-coriaceous. Propodeum posteriorly convex; spiracular sulcus indistinct. Hind leg: coxa 3.3–4.2 x as long as high. Femur 1.5–1.7 x as long as high, with a weak ventral process and well-developed comb of fine teeth. Tibia slender, dorsal furrow 0.3–0.5 x as long as segment. Apical tarsal segment slender, less than 0.5 x as wide as long. Fore wing: shape normal. Stigmal vein shorter than marginal vein; angle between stigmal and marginal veins slightly obtuse. Stump of basalis present.

Petiole: Length/width 3.2–3.3, length/height 3.2–3.7 (Fig. 18). Dorsally minutely reticulate-punctate; transverse lamina indistinct, not extending posteroventrally to midlength of petiole; lateral margins not distinctly carinate in posterior 0.5.

MALE. Differs from female as follows. Length: body 4.5–4.6 mm; forewing 2.3–2.4 mm.

Colour: Uniformly pale yellow to orange with at most small, pale brown markings on mid lobe (near pronotum) and lateral lobe of mesoscutum, axilla, hind femur basally, petiole and second metasomal segment ventrally.

Antenna: F1, F2, clava 0.8–1.3, 1.0–1.4, 2.0–2.3 x as long as wide respectively. F1 0.6–0.8 x as long as F2.

Mesosoma: Hind coxa 3.1–3.4 x as long as high. Hind femur 1.5–1.7 x as long as high.

Petiole: Length/width 3.8–4.6, length/height 4.5–5.2. Transverse lamina usually distinct.

#### ETYMOLOGY

The specific name is from the Greek meaning flask-shaped and refers to the shape of the petiole.

### *Smicromorpha banksi* sp. nov.

(Figs 2, 19)

#### MATERIAL EXAMINED

HOLOTYPE: ♀, 15°30'S 145°16'E, 1 km SE of Mt Cook, Cooktown, 13 October 1980, J.C. Cardale, in ANIC (Type No. 7592).

PARATYPE: ♀, Kar Kar Island, Kurum, New Guinea, Aug. 1968, N.L.H. Krüss, 0–100 m, n RPBH.

## DESCRIPTION

FEMALE. Length: body 3.8–4.2 mm; fore wing 2.2–3.3 mm.

Colour: Uniformly pale yellow to orange, without red-brown or black markings. Femoral teeth black.

Pubescence: Head, mesosoma, hind femur with short, depressed setae. Flagellar setae moderately long, suberect, curved.

Head: Width/length 1.9–2.0. Compound eye moderately large. Ocelli moderately large, POL/OOL 0.8–0.9, OD/OOL 0.6–0.7. OS greater than OD, frons between median ocellus and scrobes with distinct longitudinal groove. Subocular continuous, distinct. M/MAE 0.4–0.5. Antennal scrobes deep, margins carinate, lateral margin widely separated from compound eye, SW/FW 0.4–0.5, UF/LF 3.3–3.4. Vertex and upper frons minutely reticulate-punctate, lower frons and clypeus transversely striate. Antenna: F1, F2, clava 0.8, 0.7–0.8, 0.8 x as long as wide respectively. F1 0.8 x as long as F2. Flagellum fusiform.

Mesosoma: Pronotal collar laterally carinate. Omaulus present, acetabular carina distinct and continuous with omaulus, sternaulus absent. Upper mesopleuron rugose-punctate, mesopleural depression strigose to reticulate-rugose, ventral mesopleuron reticulate-rugose, pre-omaular area finely reticulate-coriaceous. Propodeum posteriorly convex, spiracular sulcus indistinct. Hind leg: coxa 4.5–4.6 x as long as wide. Femur 1.7–1.8 x as long as wide, without ventral process, with well-developed comb of fine teeth. Tibia slender, dorsal furrow 0.3–0.5 x as long as segment. Apical tarsal segment slender, less than 0.5 x as wide as long. Fore wing: shape normal. Stigmal vein shorter than marginal vein; stigmal and marginal veins form a right angle. Stump of basalis present.

Petiole: Length/width and length/height 4.5 (Fig. 19). Dorsally minutely reticulate-punctate to rugose; transverse lamina distinct, continuous, not extending posteroventrally to midlength of petiole; lateral margin not distinctly carinate in posterior 0.5.

MALE. Unknown.

## REMARKS

*S. banksi* is the only species of *Smicromorpha* known to occur in both Australia and New Guinea.

## ETYMOLOGY

The species is named for Sir Joseph Banks who collected near the type locality in 1770.

*Smicromorpha keralensis* Narendran

(Figs 48–49)

*Smicromorpha keralensis* Narendran, 1979, p. 908.

## MATERIAL EXAMINED

HOLOTYPE: ♀, in good condition, on micropin, with following labels: (i) 'Holotype'; (ii) 'Thenhippalam, Kerala, INDIA, J.C. Narendran, 25-7-1977'; (iii) '*Smicromorpha keralensis* ♀ det. Narendran 1978' in BMNH.

## DESCRIPTION

FEMALE. Unknown.

MALE. Length: body 4.3 mm; fore wing 2.4 mm.

Colour. Upper face, vertex, gena, posterior surface of head, U-shaped macula on mid lobe of mesoscutum, mid lobe of mesoseutellum except posteromedially, macula on upper mesopleuron, most of propodeum, apical 1–3 segments of fore and mid tarsi, most of hind femur, all of hind tibia and tarsus, parts of metasoma, all pale yellow to orange. Basal 2–4 segments of fore and mid tarsi, hind femur dorsally and dorso-externally (as in Narendran, 1979, fig. 5) red-brown. Lower face, clypeus, labrum, mandible, antenna, most of mesosoma, legs (except tarsi, hind femur, and hind tibia), anterior 0.3 of petiole, all black.

Pubescence: Head, mesosoma, hind femur with short, dense, appressed setae. Flagellar setae moderately long, suberect, curved.

Head: Width/length approximately 1.9. Compound eye moderately large. Ocelli moderately large, POL/OOL 1.0, OD/OOL 0.8–0.9. OS equal to OD, frons between median ocellus and scrobes convex. Subocular suture continuous, distinct, M/MAE 0.6. Antennal scrobes deep, margins carinate, widely separated from compound eye, SW/FW 0.4. Vertex of upper frons reticulate-punctate, lower frons in part and clypeus transverse-striate. Antenna: 9-segmented. F1, F2, clava 1.2, 1.5, 2.0 x as long as wide respectively. F1 0.6–0.7 x as long as F2. Flagellum sub-fusiform.

Mesosoma: Pronotal collar angulate, laterally weakly emarginate. Mesoscutum, mesoseutellum sculptured as in Figure 48. Omaulus present, acetabular carina distinct and continuous with omaulus, sternaulus present (Fig. 49). Upper mesopleuron rugose-punctate, mesopleural depression strigose to reticulate-rugose, ventral mesopleuron reticulate-rugose, pre-omaular area finely reticulate-coriaceous. Propodeum posteriorly convex with weak, median groove in posterior 0.5; spiracular sulcus indistinct. Hind

leg: coxa 3.3–3.4 x as long as wide. Femur 2.3–2.4 x as long as wide, with weak ventral process and well-developed comb of fine teeth. Tibia slender, dorsal furrow 0.3–0.5 x as long as segment. Apical tarsal segment slender, less than 0.5 x as wide as long. Fore wing: shape normal. Stigmal vein shorter than marginal vein, perpendicular to it. Stump of basalis present.

Petiole: Length/width and length/height approximately 4.4. Dorsally minutely reticulate-punctate; transverse lamina distinct, continuous, not extending posteromedially to mid length of petiole; lateral margin not distinctly carinate in posterior 0.5.

#### REMARKS

Figure 2 of Narendran (1979) incorrectly shows the compound eye as contiguous with the oral fossa. The mesonotum is more extensively black than indicated by Narendran's Figure 4.

#### ACKNOWLEDGEMENTS

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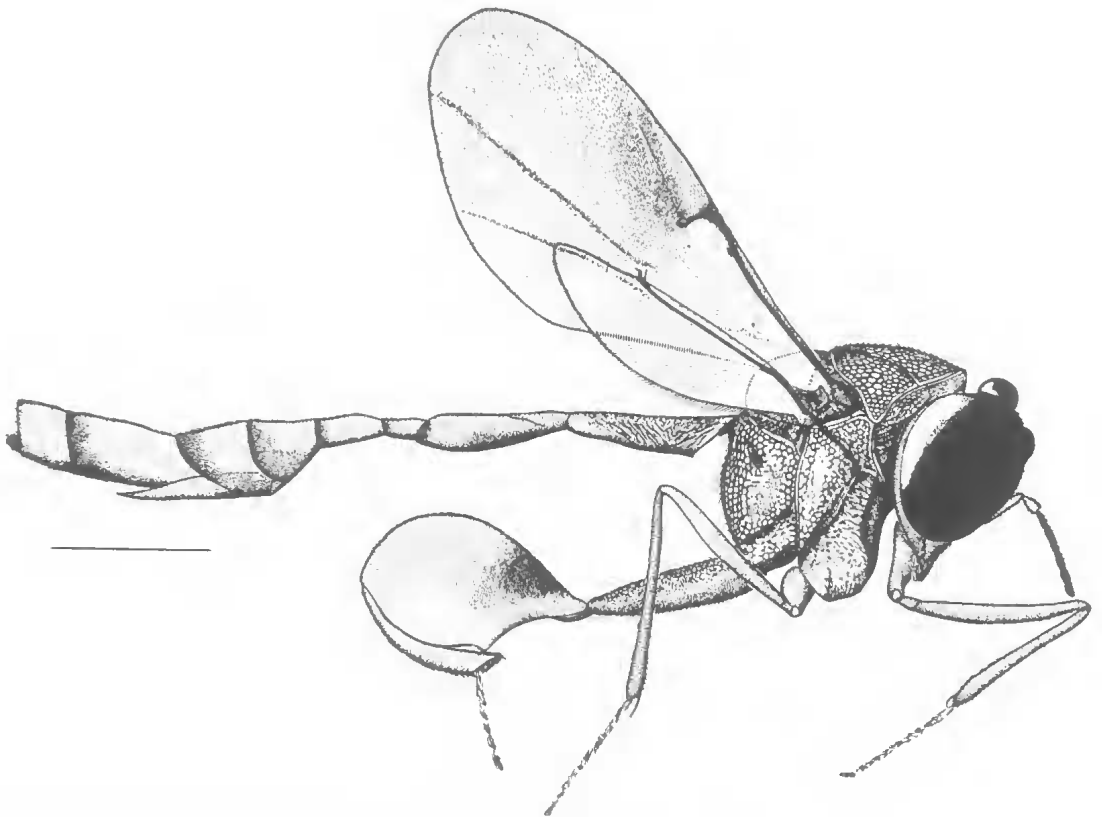


FIG. 1. *Smicromorpha doddi* Girault, female. Scale line = 0.5 mm.

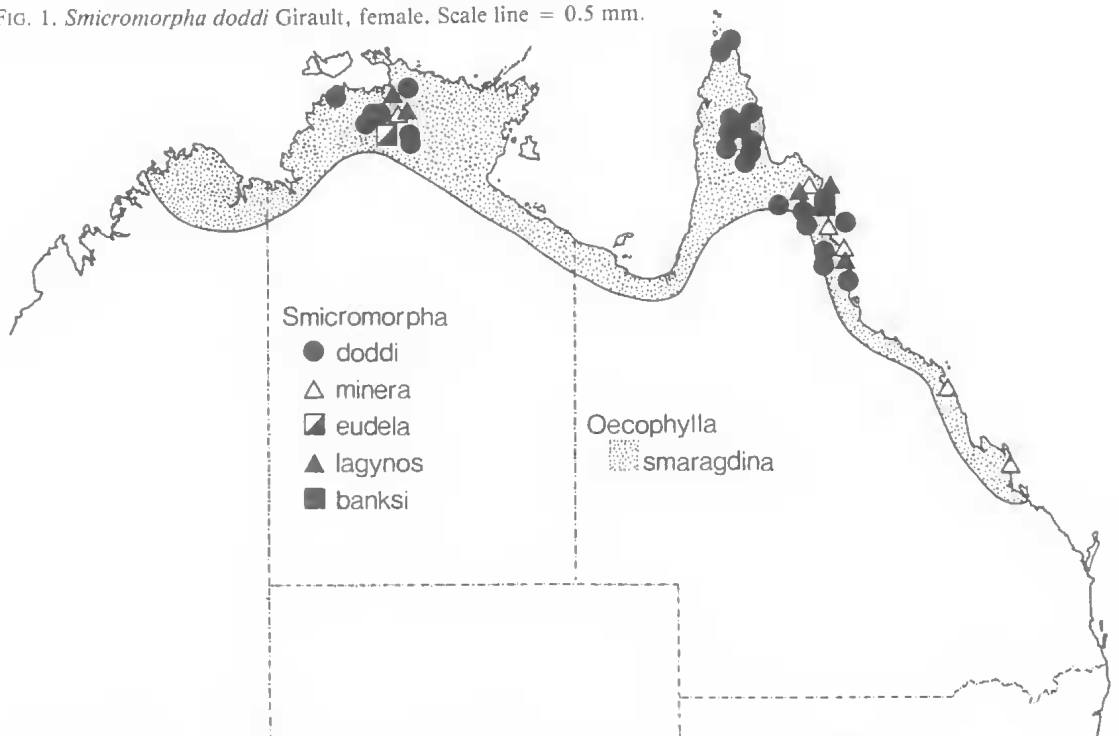


FIG. 2. Distribution of *Smicromorpha* spp. and *Oecophylla smaragdina* (Fabricius) in Australia.

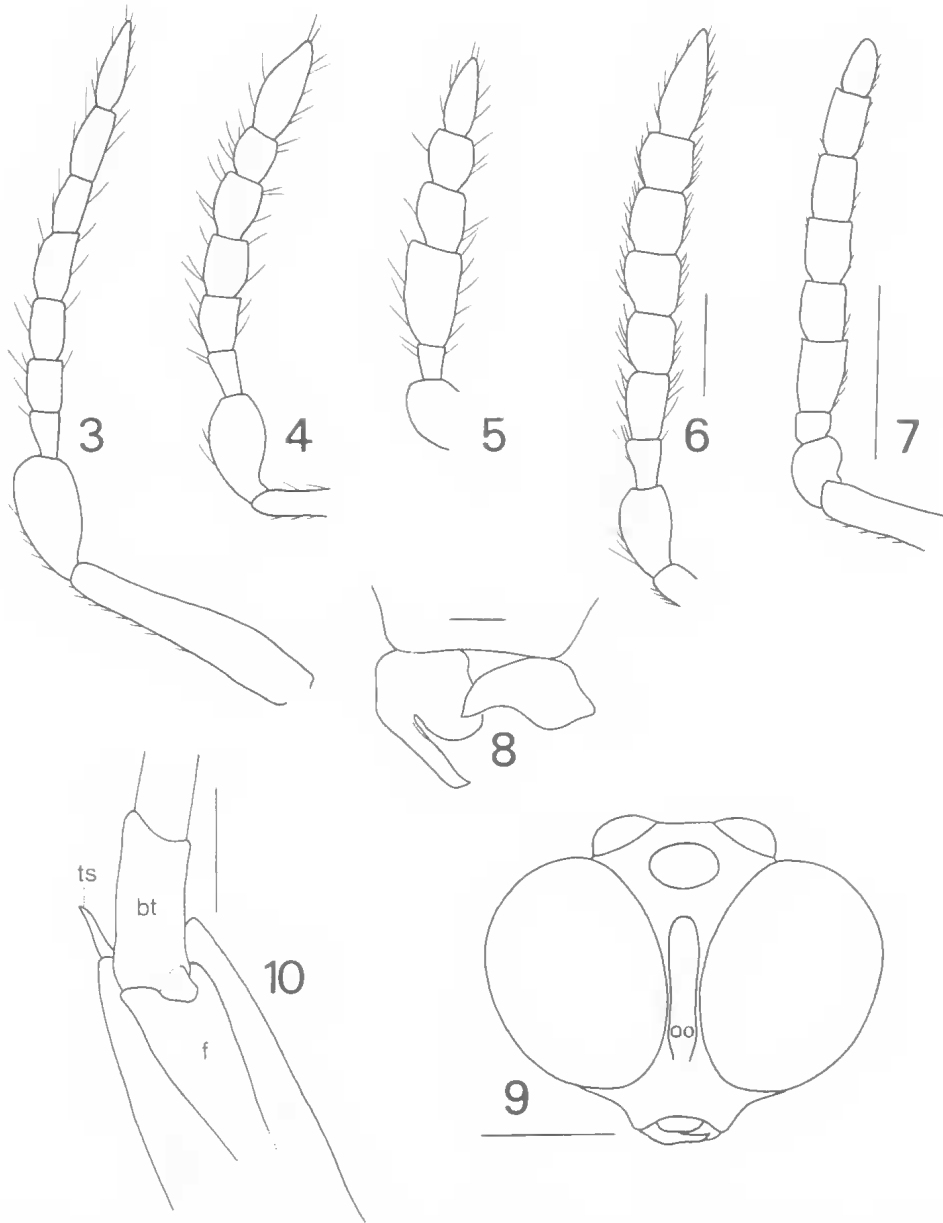


FIG. 3-10. *Smicromorpha* spp., 3, 8, 9, 10, *S. doddi* Girault, female; 4, 5, *S. doddi*, male; 6, *S. lagynos* sp. nov., paratype male; 7, *S. eudela*, sp. nov., holotype male; 3-7, antennae (apex of scape only shown in 4, 6, 7, apex of pedicel only shown in 5); 8, mandibles, frontal view; 9, head, frontal view; 10, hind tibial groove, dorsal view. Scale lines = 0.5 mm for 6, 8 and 10; = 0.1 mm for 7 and 9; 3-6 to same scale.



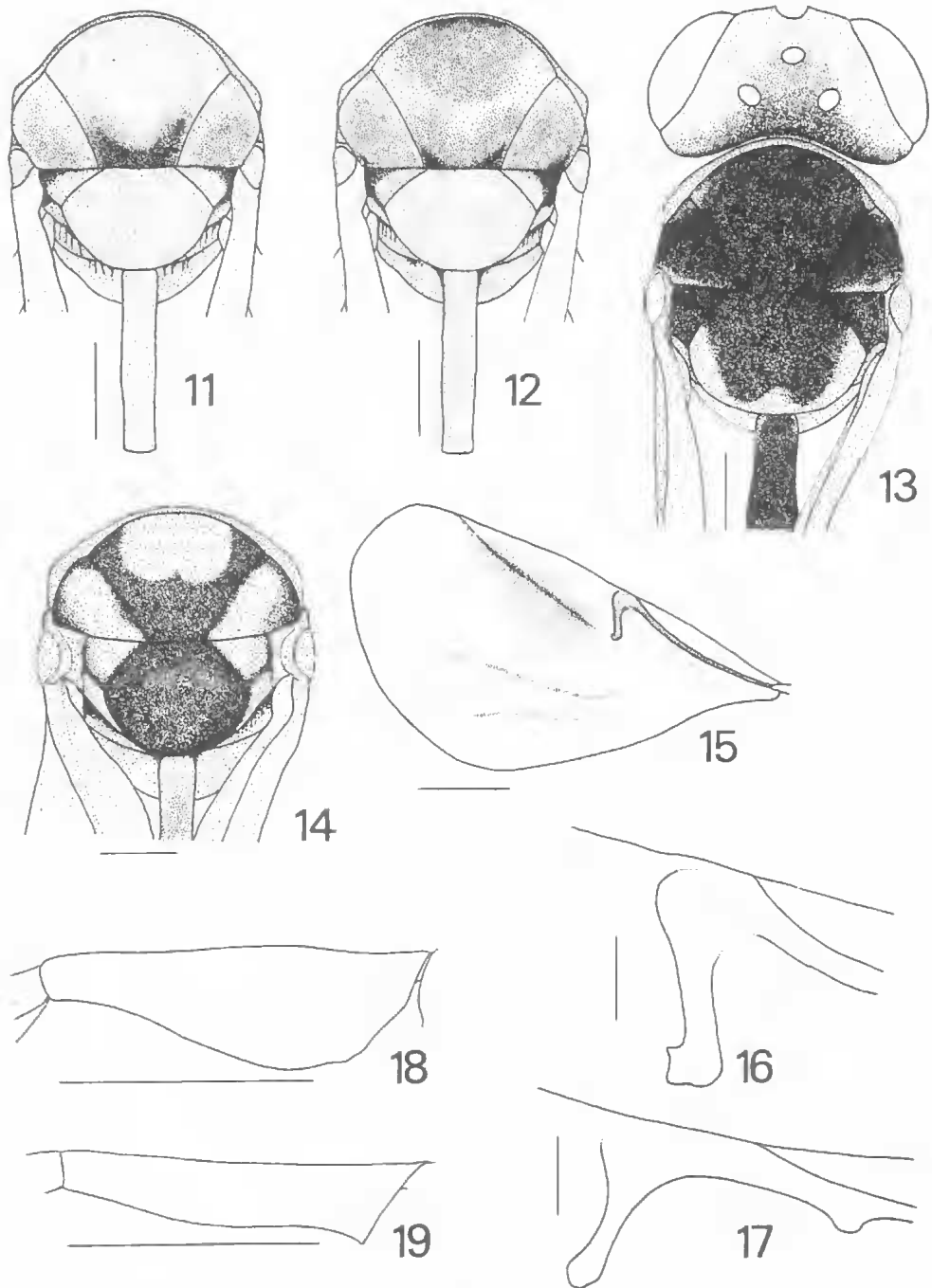


FIG. 11-19. *Smicromorpha* spp. 11, 12, *S. doddi* Girault, female, Lockerbie; 13, *S. lagynos*, sp. nov., paratype female; 14, *S. minera* Girault, holotype female; 15, 16, *S. eudela*, sp. nov., holotype male; 17, *S. doddi*, female; 18, *S. lagynos*, holotype female; 19, *S. banksi*, sp. nov., holotype female; 11, 12, 13, 14, colour patterns of dorsal mesosoma; 15, 16, 17, fore wing venation; 18, 19, lateral view of petiole. Scale lines = 0.5 mm for 11-17, =0.1 mm for 18, 19.

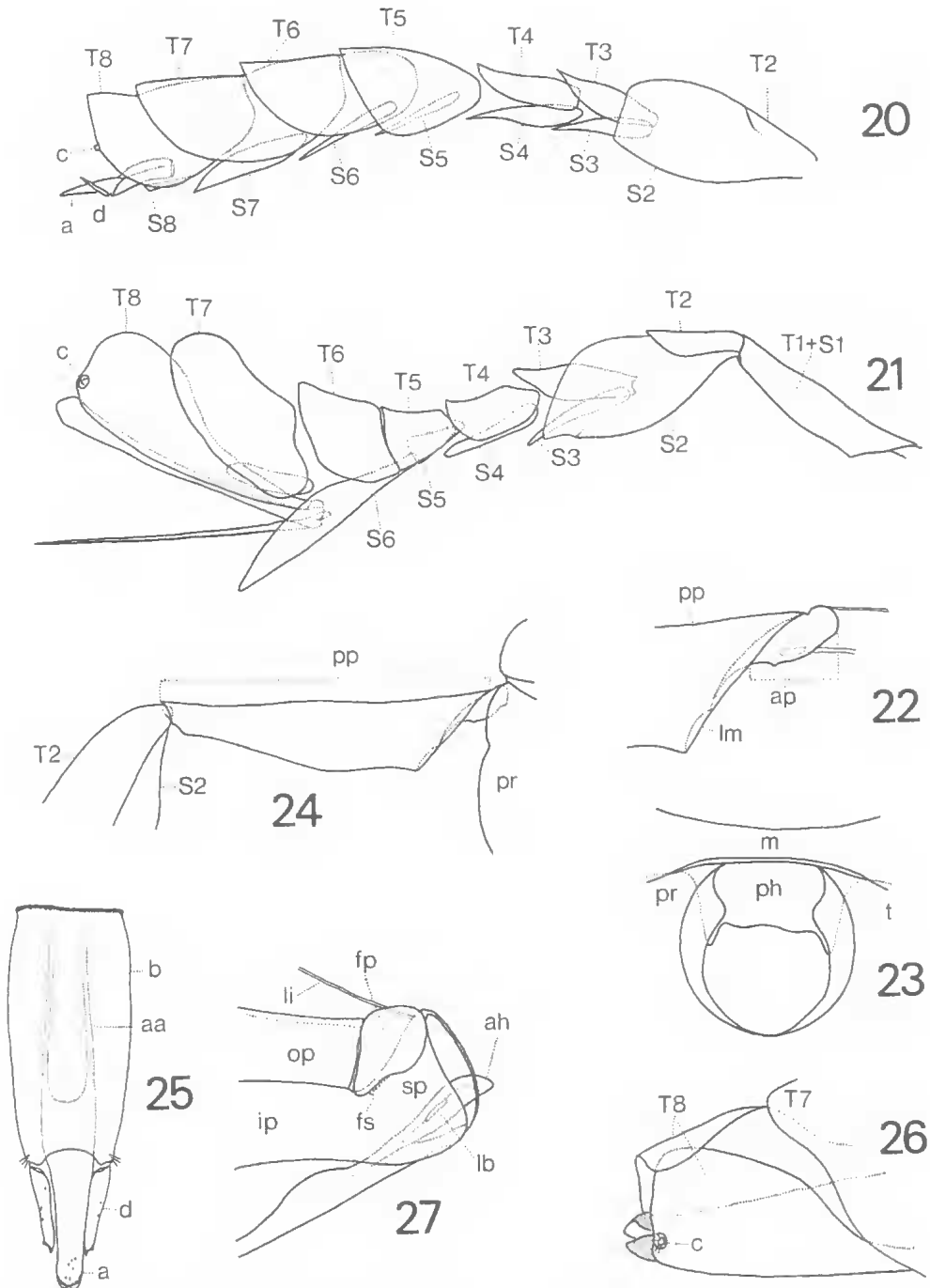


FIG. 20-27. *Smicromorpha doddi* Girault. 20, lateral view, male metasoma, petiole (= T1 + S1) omitted; 21, lateral view, female metasoma; 22, lateral view, anterior articulation of petiole; 23, anterior view, petiolar foramen of propodeum; 24, lateral view, petiole; 25, ventral view, male genitalia; 26, dorsolateral view, posterior extremity of female metasoma; 27, lateral view, anterior ovipositor sclerites (ovipositor retracted). See text for explanation of abbreviations.

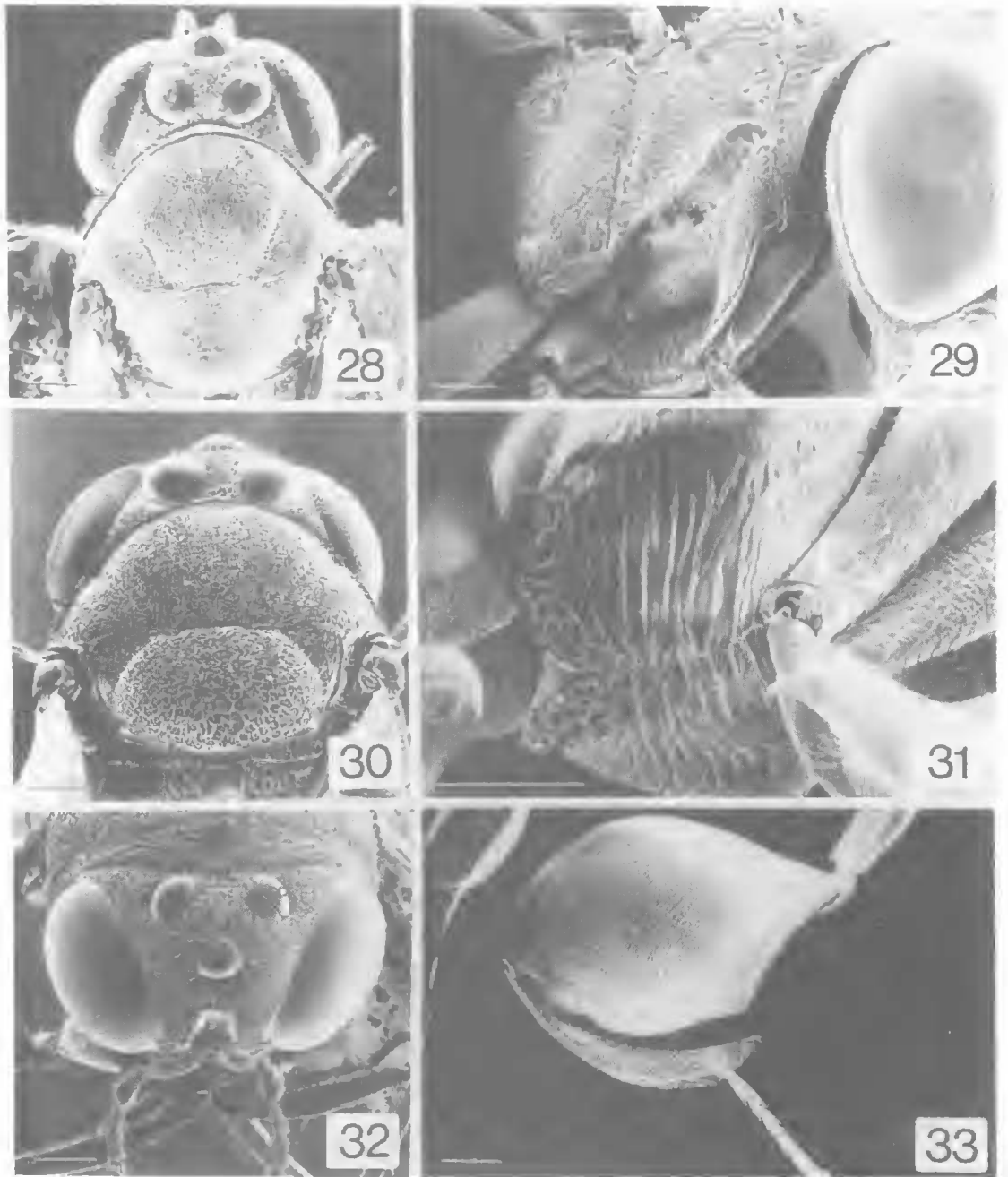


FIG. 28-33. *Smicromorpha doddi* Girault 28-31, 33, female; 32, male. 28, dorsal view, head and mesosoma; 29, lateral view, head and mesosoma; 30, posterodorsal view, head, mesosoma and petiole; 31, ventrolateral view, mesothorax; 32 dorsal view, head; 33, lateral view, hind leg. Scale line = 0.2 mm. See text for explanation of abbreviations.

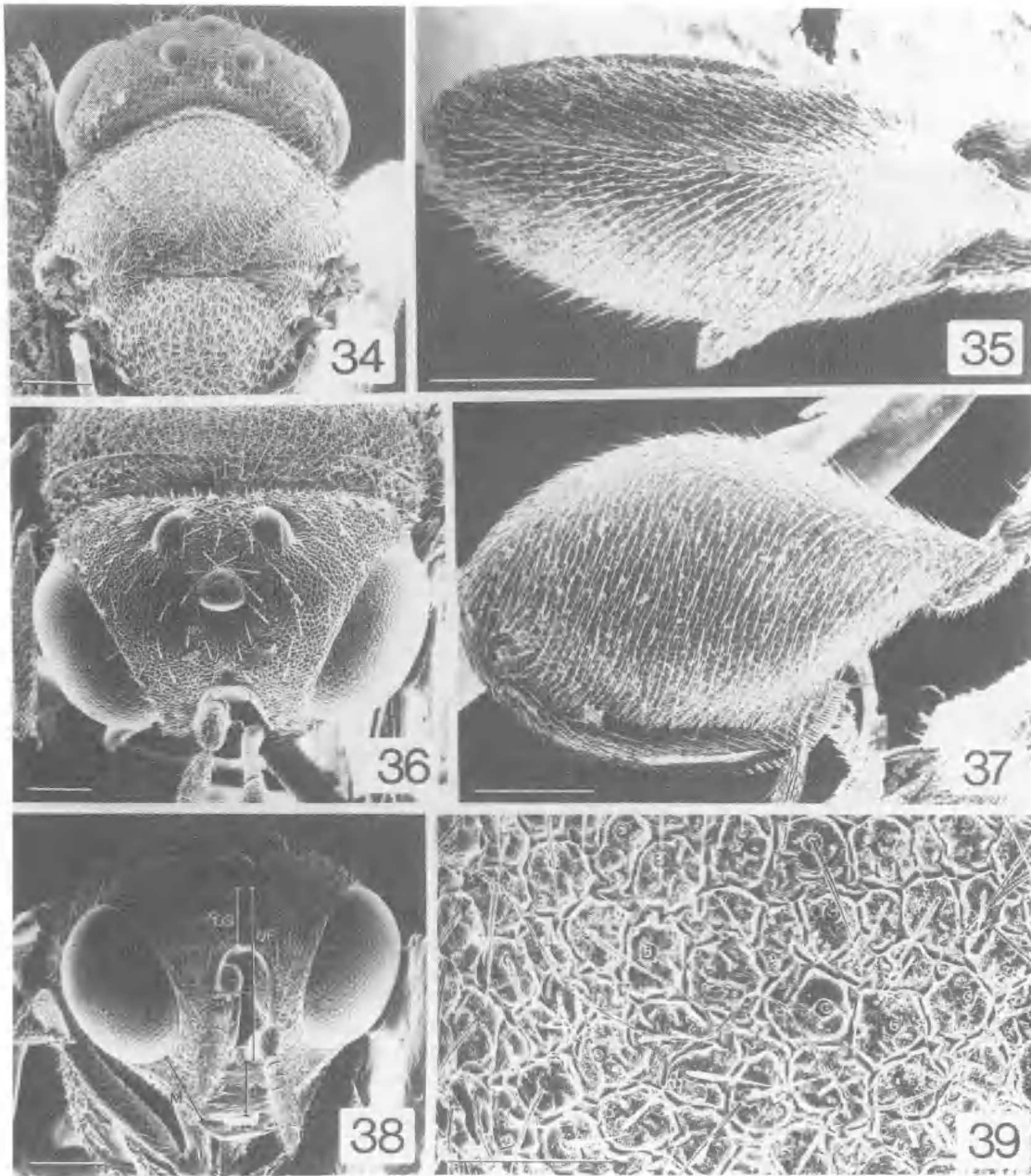


FIG. 34-39. *Smicromorpha minera* Girault, female. 34, dorsal view, head and mesosoma; 35, dorsal view, hind leg; 36, dorsal view, head; 37, lateral view, hind leg; 38, frontal view, head; 39, detail, mesoscutal microsculpture. Scale line = 0.2 mm for 34-38, = 0.1 mm for 39. See text for explanation of abbreviations.

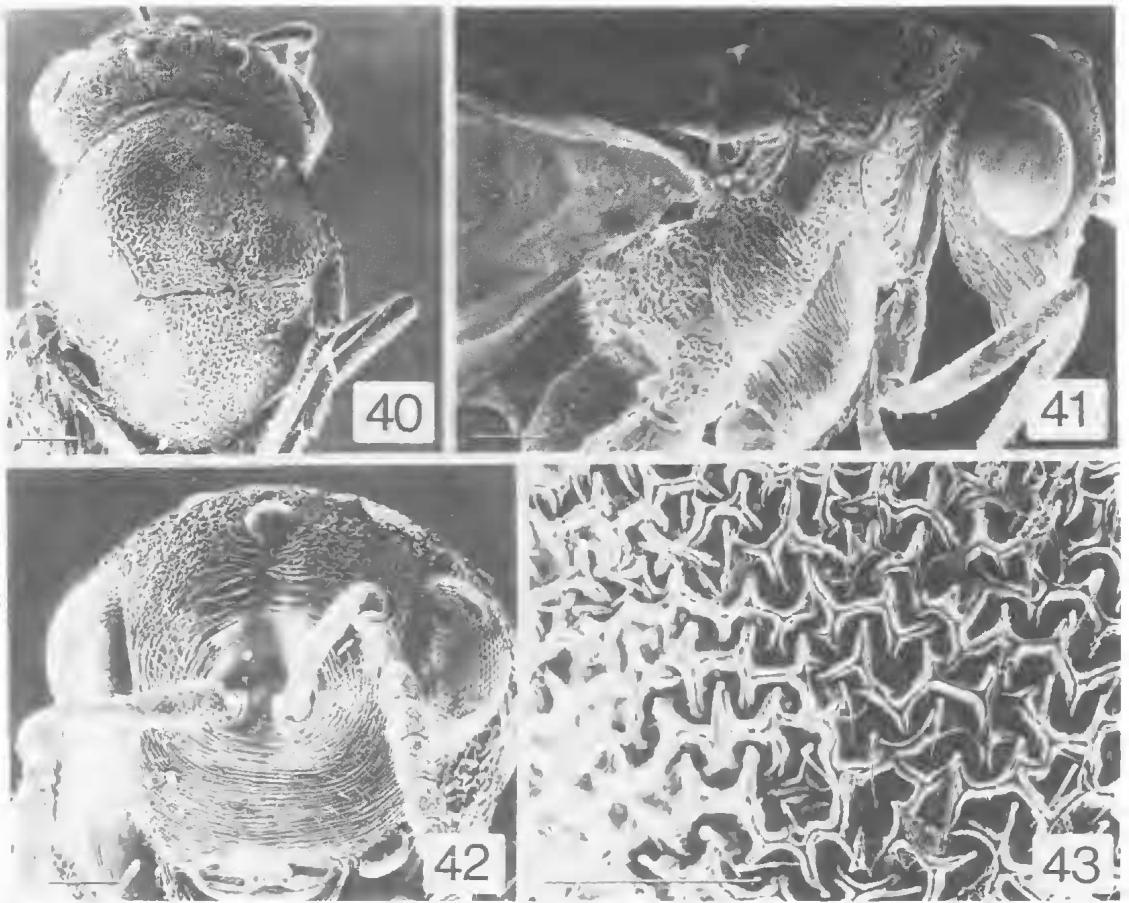


FIG. 40-43. *Smicromorpha eudela*, sp. nov., holotype male. 40, dorsal view, head and mesosoma; 41, lateral view, head and mesosoma; 42, frontal view, head; 43, detail, mesoscutal microsculpture. Scale line = 0.2 mm for 40-42, = 0.1 mm for 43.



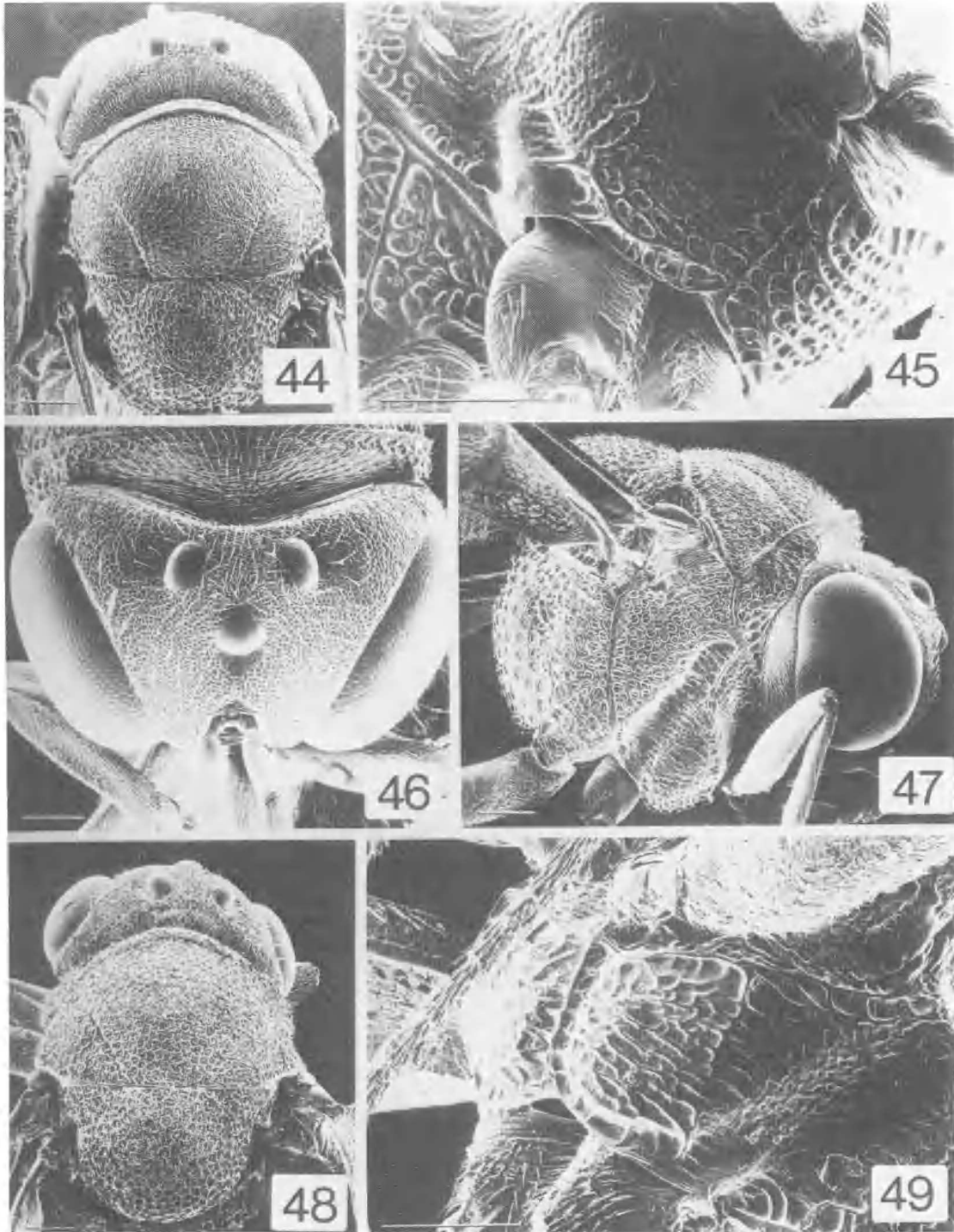


FIG. 44-49. *Smicromorpha* spp. 44-47, *S. lagynos*, sp. nov., paratype female; 48, 49, *S. keralensis* Narendran, holotype male. 44, dorsal view, head and mesosoma; 45, ventrolateral view, mesothorax; 46, dorsal view, head; 47, lateral view, head and mesosoma; 48, dorsal view, head and mesosoma; 49, ventrolateral view, mesothorax. Scale line = 0.2 mm.